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Jeon, Yongil and Miller, Stephen M., "Has Deregulation Affected Births, Deaths, and Marriages in the U.S. Commercial Banking Industry?" (2005). *Economics Working Papers*. 200524.
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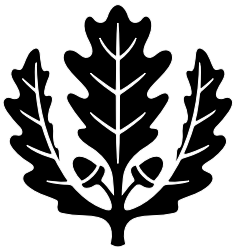

University of Connecticut

Department of Economics Working Paper Series

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Working Paper 2005-24

January 2005

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Abstract

Regulatory change not seen since the Great Depression swept the U.S. banking industry beginning in the early 1980s and culminating with the Interstate Banking and Branching Efficiency Act of 1994. Banking analysts anticipated dramatic consolidation with large numbers of mergers and acquisitions. Less well documented, but equally important, was the continuing entry of new banks, tempering the decline in the overall number of banking institutions. This paper examines whether deregulation affected bank new-charter (birth), failure (death), and merger (marriage) rates during the 1980s and 1990s after controlling for bank performance and state economic activity. We find evidence that intrastate deregulation stimulated births and marriages, but not deaths. Moreover, we find little evidence that interstate deregulation affected births, deaths, or marriages, except that the marriage rate rose after the implementation of the Interstate Banking and Branching Efficiency Act. Finally, pair-wise temporal causality tests among births, deaths, and marriages show that mergers temporally lead new charters and that failures lead mergers (a demonstration effect).

Journal of Economic Literature Classification: G21, L51

Keywords: commercial banks, new charters, failures, mergers

An earlier version, ”Births, Deaths, and Marriages in the U.S. Commercial Banking Industry” was presented at the Eastern Economic Association meetings, New York City, February 2001. We acknowledge the helpful comments of the discussant, T. Critchfield, and a colleague, B. Wimmer.

Has Deregulation Affected Births, Deaths, and Marriages in the U.S. Commercial Banking Industry?

1. Introduction

The twentieth century witnessed two periods of dramatic regulatory and structural change in the U.S. banking industry – the Great Depression and the events of the 1980s and 1990s. While many important regulations were enacted during the Great Depression, the 1980s and 1990s experienced the repeal or reversal of most depression-era financial regulations. The 1980s and early 1990s experienced severe financial turbulence – the savings and loan crisis followed by another crisis in the commercial banking industry. Those crises led to failure rates among financial institutions not seen since the Great Depression. As a consequence, the 1980s and 1990s saw deregulation that transformed the banking industry from one with much geographic limitation on banking and branching to one now characterized by interstate banking and branching.[1]

The theory of industrial organization addresses several stylized facts or empirical regularities of industry dynamics: (1) entry is common; (2) entry is small scale; (3) survival is low-probability, and (4) entry and exit are highly correlated (see Dunne, Roberts, and Samuelson 1988, and Pepall, Richards, and Norman 2002, Ch. 6). Moreover, the fourth empirical regularity contradicts standard microeconomic theory where entry associates with high-performing, profitable, expanding industries while exit associates with low-performing, unprofitable, contracting industries. The empirical evidence implies that the process resembles a lottery where many firms buy tickets (i.e., enter the market), most firms eventually lose (i.e., exit the market),

[1] Conventional wisdom suggests that the emergence of interstate banking and branching generated a significant increase in mergers and acquisitions (Rhoades 2000, and Jeon and Miller 2003). One view of the consolidation process in the banking industry suggests that it is by and large a positive event -- banks became more efficient (Jayaratne and Strahan, 1997, 1998) and better-run banks increased their market share (Stiroh and Strahan, 2003). Another view sees a possible negative effect of consolidation on the availability of loans to small businesses (Ely and Robinson, 2001). Still another view notes that recent merger activity increased measures of industry concentration and profitability, where concentration temporally led profitability (Jeon and Miller 2004). Together, failures and mergers led a large exodus of institutions from the banking industry. New charters counterbalanced that

and only a few firms win (i.e., stay in the market). In other words, long-term, permanent penetration into an existing market presents significant barriers and few firms succeed, since incumbent firms possess significant advantages (Urban, Carter, Gaskin, and Mucha 1984, and Pepall, Richards, and Norman 2002, Ch. 6).

The commercial banking industry during the recent two-decade period of deregulation experienced those standard empirical regularities with some variations. That is, entry occurred frequently and generally involved small banks. A minority of banks survived. The number of entries and exits both increased dramatically during the last two decades, although exits typically exceeded entries as the number of banks traversed a downward trend. In addition, exits in the regulated banking industry generally involve mergers, even for failing banks.[2]

The U.S. commercial banking industry possesses institutional characteristics that affect how the industry dynamics correspond to and differ from those empirical regularities. First, the founding fathers exhibited much concern about preventing concentrations of power. They adopted rules and regulations, attempting to prevent such concentrations of power from emerging. That concern bore fruit in the banking industry in the peculiar pattern of bank charters – a dual banking system – and the regulation of banking activity on a geographic basis. Thus, as we entered the last two decades of the 20th century, the U.S. possessed many more banks per capita than most other countries in the world.[3] The deregulation of geographic restrictions on banking activity expectedly led to a decline in the number of banks. Thus, although both entries and exits played a significant role over the last two decades, exits generally exceeded entries so that the total number of banks fell, as noted above.

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movement to some extent.

[2] Our data on mergers, however, include only unassisted mergers while failures include government-assisted mergers and outright failures. See DeYoung (1999) for the life-cycle of new bank entrants.

[3] For example, Canada currently has 8 domestic banks and 43 foreign banks in 1998. Although relative large in number, foreign banks held just over 1 percent of total Canadian bank assets at the end of 1998. The U.S., on the other hand, had 8,774 banks at the end of 1998.

Second, the banking industry plays a critical role in any nation's economy. The loss of confidence in the banking industry that led to subsequent bank panics and runs provided the typical scenario for recession and depression throughout the 19th century.[4] Consequently, the banking industry in the 20th century exhibited significant control on entry and exit by the various banking regulators. That is, the number of bank entries and exits probably fell below those that would have naturally occurred in an unregulated banking industry.[5]

Finally, exits encompass two different events – failures and mergers. Failing banks cannot freely exit; they must place themselves in the hands of the regulators. In addition, experience shows, except during the Great Depression, that the predominant form of exit occurs through merger, and not failure. In other words, the regulatory environment probably increased the number of mergers and reduced the number of failures relative to an unregulated banking industry.

This paper focuses on important elements of those events – births (new charters), deaths (failures), and marriages (mergers) -- in the commercial banking industry. We use pooled cross-section, time-series data, employing pooled and random-effects Tobit specifications both with and without robust or bootstrap estimation techniques. Our analysis contains two foci. First, we consider the effects, if any, of regulatory control over the evolution of the U.S. banking industry by examining births, deaths, and marriages in each state. Specifically, variables that capture the effects of intrastate and interstate branching and merger regulation may possess important effects on the dynamic evolution of the banking industry. Moreover, we condition the findings on private business decisions such as balance-sheet, income–statement, and state-specific business-cycle effects. Two findings stand out. One, the more-permissive intrastate branching regulation

[4] Goldfeld and Chandler (1981, p. 194) state that "full-fledged (banking) panics in 1873, 1884, 1893, and 1907; … most banks suspended payments for periods of varying lengths; … and business activity suffered."

[5] The chartering process restricts bank entries. Moreover, government regulators' willingness to assist troubled and failing banks provides another brake on bank exits.

correlates positively with new charters and mergers, but does not significantly correlate with failures. Two, at the same time, interstate banking and branching regulation do not generally exhibit significant effects on births, deaths, and marriages. The exception, the most-recent, more-permissive national interstate deregulation does associate with more merger activity.

Second, we also employ temporal causality tests to consider the timing relationships between births, deaths, and marriages. We find that mergers temporally lead new charters, supporting the findings of Berger, Bonime, Goldberg, and White (1999) and Keeton (2000), but countering those of Seelig and Critchfield (1999).[6] In addition, failures also temporally lead mergers, suggesting a "demonstration effect". In other words, bank failures signal to other weak banks that they should seek merger partners, sooner rather than later.

The paper progresses as follows. Section 2 provides an overview of regulatory and structural change over the past 25 years. Section 3 examines the existing literature that considers new charters, failures, and mergers. Section 4 offers an intuitive explanation of bank births, failures, and marriages, describes the database, and outlines the empirical tests. Section 5 discusses the empirical findings. Section 6 concludes.

2. Regulatory and Structural Change: An Overview

The regulatory environment within which the U.S. commercial banking industry operates has undergone significant adjustment in the last twenty years, including, but not limited to, the Depository Institution Deregulation and Monetary Control Act of 1980, the Depository Institution Act of 1982, and the Interstate Banking and Branching efficiency Act of 1994.[7] Because of its regulatory history, the U.S. banking industry possesses many more independent institutions than is the norm in the rest of the world.

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[6] Conventional wisdom argues that the unemployed officers of a merged bank frequently acquire a charter and open a new bank, providing a rationale for the mergers lead new charters finding.

[7] Our historical discussion of banking regulation relies heavily on Kane (1996) and Kroszner and Strahan (1999).

Early in U.S. banking history, commercial banks received their charters from individual states and could not operate across state lines. The passage of the National Banking Act of 1864 established the chartering of national banks by the Comptroller of the Currency, but this new legislation, although silent on the issue of branching by the national banks, was interpreted as conforming to existing prohibitions against branching across state borders. The McFadden Act of 1927 and the Banking Act of 1933 generally prohibited branching across state lines.[8]

Turning our attention to intrastate banking, state legislation has generally liberalized its rules on branch banking within states' borders. Historically, states were divided into three groups: (i) those states that permitted statewide branching with few restrictions, (ii) those states that permitted limited statewide branching with numerous restrictions, and (iii) those states that permitted only unit banking with essentially no branching activity. Legislative activity gradually reduced the number of states to a very few that have unit banking or limited branching.

Branching and merger restrictions were originally promulgated to prevent banking institutions from monopolizing credit markets. That same legislation, however, frequently granted local monopoly power to smaller community banks. Thus, the relaxation of restrictions on interstate and intrastate banking and branching may lead to the acquisition of a large number of small community banks. An important policy concern associated with such a prospect is the

[8] Several loopholes existed, however, in the legal landscape. First, a number of banks already operated across state lines at the time of the McFadden Act legislation. Those institutions' operations were grandfathered. But second, and more important, bank holding companies were permitted to acquire banks across state lines. The Douglas Amendment to the Bank Holding Company Act of 1956 partially closed that second loophole, unless such cross-state acquisitions by bank holding companies were explicitly permitted by the states involved. Maine first mined that remaining loophole in 1975 when it adopted legislation permitting out-of-state bank holding companies to acquire Maine banks, if reciprocity existed in the states of the acquiring holding companies. But substantial movement did not really begin until 1982 when New York passed similar reciprocity legislation and Massachusetts passed regional reciprocity legislation restricted to the New England states. The overtures by New York and Massachusetts led to a patchwork of regional reciprocity pacts over the next few years. Most states participated in one or more regional packs with California, New York, and Texas as notable exceptions (exclusions). Although banks were permitted to acquire failed thrift institutions across state lines as a result of the savings and loan crisis, the bulk of bank mergers across state lines still proceeded through bank holding companies. Finally, and most recently, the Interstate Banking and Branching Efficiency Act of 1994 permitted banks to acquire banks in other states.

effect on the supply of credit to small businesses, organizations that many see as the real engines of growth (Ely and Robinson, 2001).

In sum, economic events, individual bank performance, and regulatory changes have produced merger and failure activity in the U.S. commercial banking industry not seen since the Great Depression. Furthermore, many new commercial banks entered the market with new charters, tending to moderate the decline in the number of banking institutions.

3. Literature Review

Several papers explore the recent activity in new charters, failures, and mergers, although none consider all three activities together. Amos (1992) examines the regional pattern of commercial bank failures during the 1980s (i.e., 1982 to 1988). He uses the state as his level of observation and generates a cross-section sample of 50 observations by averaging the bank failure data across the 1982 to 1988 period. He introduces regulatory (e.g., dummy variables for branching regulation) and state-level macroeconomic variables (e.g., gross state product, sectoral composition of gross state product) to explain the pattern of bank closings. He concludes that states experience higher failure rates when the state's economy possesses a larger share in oil and gas extraction and more volatility in economic variables. He finds little evidence suggesting that failures correlate with the branching status dummy variables or states with higher concentrations of farming or manufacturing.

Cebula (1994) modifies and improves Amos's (1992) analysis in three ways. He introduces bank financial variables in addition to the state-level economic and regulatory variables. He also extends the sample through 1992 and adjusts the regression analysis for heteroskedasticity. He follows Amos (1992) and averages the data over the 1982 to 1992 period and performs cross-section regressions with 50 observations. He derives several additional general conclusions. States with higher capital ratios and lower net charge-offs to loans correlate

with lower failure rates. More limited evidence emerges that easier regulation on branching and a higher average cost of funds associates with a higher bank-closing rate.

Amos (1992) and Cebula (1994) both consider the effect of intrastate branching regulation on the bank failure rate. Amos includes dummy variables for statewide and unit branching states, finding no significant effects. Cebula substitutes a dummy variable for limited branching states, implying that statewide and unit banking states come from the same specification. He finds that the failure rate was significantly lower in limited branching states. Cebula also includes a dummy variable for those states that prohibited interstate banking, but the coefficient on that interstate banking dummy variable is not significant.

Chou and Cebula (1996) perform a similar analysis of the failure rates across states for the savings and loan industry. They consider savings and loan failures in each state over the 1985 to 1988 period relative to the average number of savings and loans in operation from 1984 to 1988. Since some of the observations on the failure rate are zero, they use the Tobit model with heteroskedastic errors. They find that four types of variables correlate significantly with the failure rate – regional economic conditions (e.g., the average growth rate of GSP), financial variables (e.g., the average cost of funds), regulatory structure (e.g., federally chartered stock institutions to all FSLIC-insured institutions), and political variables (e.g., dummy variables indicating that states had representation on the Senate Banking, Housing, and Urban Affairs Committee or the House Banking, Finance, and Urban Affairs Committee). Their most robust findings include the following: failure rates associate negatively with the growth rate of gross state product, positively with the average cost of funds, positively with the proportion of stock (rather than mutual) associations, and negatively with federally chartered (rather than state chartered) stock associations.

Stiroh and Strahan (2003) consider the effects of intrastate and interstate branching and banking deregulation on exit dynamics, by which they mean mergers and failures. They find

some evidence that the exit (merger plus failure) rate rose after deregulation of intrastate and interstate branching and banking. Their findings, unlike Amos (1992), Cebula (1994), Chou and Cebula (1996), or our paper, do not control for other possible correlates with the exit rate.

DeYoung (1999) explores the life cycle of *de novo* banks in the U.S. since 1980. He finds that newly chartered banks possess lower failure rates than existing commercial banks during the first few years of operation. But, their failure rate rises to exceed that of existing banks after those first few years and then converges back to the failure rate of established banks over time. DeYoung then proposes a simple life-cycle model of *de novo* bank failure and tests that theory with a hazard model for a sample of 303 newly chartered banks. The initial capitalization of *de novo* banks explains their initial lower failure rate when they earn negative net incomes. The capital cushion, however, disappears before net income becomes positive and stable enough to stave off failure for those *de novo* banks that do fail. DeYoung concludes that if the policy objective focuses on eliminating the failure of newly chartered commercial banks, then regulators should increase the initial capital requirements for *de novo* entry. Significant increases of capital requirements, however, may too severely restrict the number of *de novo* entries in DeYoung's view. In other words, regulators should not prevent all bank failures.

Amel and Liang (1997) apply a two-equation model of entry and performance (profitability) to the U.S. commercial banking industry. They examine the hypothesis that bank entry limits persistent above-average profits in a competitive environment. By entry, they mean new banks (new charters) or new branches. Their database includes the entry of new banks and new branches into local banking markets from 1977 to 1988 – over 4,000 entries into 2,300 local banking markets. They conclude that the competitive process exists in the U.S. commercial banking industry, where higher profits attract entry and entry reduces profits. Moreover, market size and growth, measured by population and its growth, correlate positively with bank entry. Finally, legal branching restrictions play a minor role in explaining bank entry.

Another group of papers consider the temporal relationship between new entrants and mergers. Berger, Bonime, Goldberg, and White (1999), Keeton (2000), and Seelig and Critchfield (1999) investigate whether new bank entrants fill a void left by bank mergers. That is, new entrants provide services to small businesses and other bank customers formerly provided by banks that have now merged into larger organizations.[9] That conventional wisdom implies that bank mergers lead to new entrants. Seelig and Critchfield (1999) challenge conventional wisdom with their empirical findings that mergers dissuade entry. Berger, Bonime, Goldberg, and White (1999) support conventional wisdom with their empirical results. Most recently, Keeton (2000) also finds support for the mergers-imply-new-entrants hypothesis. Moreover, he criticizes the methods of the previous two papers and offers an improved method. Keeton (2000) concludes that "… new bank formations may offset some of the harmful effects of mergers, making it more likely that banking consolidation is beneficial on balance." (p. 35).

4. Descriptive Model, Database, and Empirical Tests

Descriptive Model

The dynamic structure of industries evolves as firms enter, exit, and merge. Entry and exit of firms provide the key elements to the efficient operation of a competitive market.[10] In the banking industry, the experience of the nineteenth century shows that many recessions associated with bank (financial) panics, where the private sector lost confidence in the banking industry. In sum, while free entry and exit makes most markets work efficiently, such freedom can lead to a loss of confidence in the banking industry and precipitate a banking panic. Thus, traditionally regulators control entry into, exit from, and merger within the banking industry.

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[9] Keeton (2000) uses that cause-and-effect argument. An alternative hypothesis views increased merger activity as a signal that bank charters go at a premium. Thus, new entrants acquire a bank charter solely to have it acquired by another bank through merger.

[10] Jayaratne and Strahan (1998) argue that for the U.S. banking industry "severe restrictions imposed on the geographic scope of banks retarded the natural process of selection whereby better-managed, lower-cost banks expand at the expense of inefficient ones." (p. 240).

Competitive markets experience the entry (birth) of new firms, the exit (death) of existing firms, and the merger (marriage) of existing firms as a consequence of the individual performance of the firms in an industry as well as the aggregate performance of the overall economy. In other words, births, deaths, and marriages of firms within an industry depend on the general state of the economy as well as managerial decisions within firms that produce those firms' performances. Better average individual firm performance and/or a more vibrant overall economy probably generates more births, fewer deaths, but an ambiguous effect on marriages.

In the banking industry, we must consider the effects of regulation, in addition to the performances of the average individual bank and the overall economy. The deregulation instituted over the last 25 years in the U.S. weakened restrictive policies that permitted many mergers both within and between states. As banks merged and grew bigger, a niche opened for new bank entry, which the new, more-relaxed regulatory environment aided and abetted. Finally, since deregulation increases competition, competitive pressures force weak, poor-performing banks to improve their performance or leave the industry through mergers or failures.[11] In sum, deregulation should, holding other things constant, generate increases in births, deaths, and marriages. The empirical work that follows examines the effects of individual bank performance (more precisely the average performance of banks within each state), the state economy's performance, and deregulation on births, deaths, and marriages in the U.S. banking industry. Reiterating our main focus, we consider how deregulation affects the process of births, deaths, and marriages.

Database

The Federal Deposit Insurance Corporation reports balance sheet and income statement data

[11] Winston (1998), in a survey, provides a good discussion of the effects of deregulation on the dynamics of industry structure.

aggregated for each state and the District of Columbia.[12] We supplement this data with state-level macroeconomic information on population and the unemployment rate.[13] Our cross-section time-series database includes the 50 states and the District of Columbia over 21 years from 1978 to 1998 – a pooled data set of 1071 observations. We also perform temporal causality tests between new-charter, failure, and merger rates using data from 1969 to 1998 across the 50 states and the District of Columbia – a pooled data set of 1530 observations.

Our analysis examines the determinants of birth, death, and marriage rates as measured by the ratio of new charters, failures, and mergers to total banks in each state (and the District of Columbia) for each year.[14] Our explanatory variables fall into three categories – branching and merger deregulatory variables, state-level bank information, and state-level economic data.

Several variables capture the regulatory stance of states with respect to mergers and acquisitions on an intrastate and interstate basis. Two variables capture intrastate deregulation. First, the ratio of branches to banks measures the effective regulatory stance in the state with respect to branching.[15] Second, a dummy variable captures intrastate multibank holding company activity within state borders. Three dummy variables capture interstate deregulatory activity – that is, the regulatory stance in each state vis-à-vis bank mergers through multibank holding companies across states. A state could allow out-of-state bank holding companies to acquire

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[12] The commercial bank balance sheet and income data on a state-by-state basis come from the Federal Deposit Insurance Corporation (http://www2.fdic.gov/hsob/).

[13] The Census Bureau (http://www.census.gov/population/www/estimates/statepop.html) and the Bureau of Labor Statistics (http://www.bls.gov/top20.html) report population and unemployment rate data on a state-by-state basis.

[14] The FDIC merger rate includes mergers of banks that belong to the same organization, and thus are regarded as corporate reorganizations that eliminate duplicative boards of directors. Not surprisingly, such mergers increased with the deregulation of restrictions on branching and multi-bank holding company activity. Similarly, entries include new charters issued to existing banking organizations, but exclude new branches within banking organizations. Some analysts argue for the exclusion of such corporate reorganization effects. We argue for their inclusion, since we consider the effects of deregulation on births, deaths, and marriages, including corporate reorganizations.

[15] Many studies include dummy variables for unit, limited, and statewide branching regulation. Kaparakis, Miller, and Noulas (1994) use the ratio of branches to banks to categorize states into these three categories. We use the actual ratio of branches to banks to capture the branching regulatory effect. This measure captures the actual effect of regulatory practices of state branching regulations.

banks within its borders with or without conditions (reciprocity). For example, some states allow bank holding companies from other states to acquire a bank within its borders only for the set of states that also allow bank holding companies from this state to acquire banks within their borders. All such regulations became abrogated with the passage of the Interstate Banking and Branching efficiency Act of 1994, which permitted bank holding company operations on a national basis without geographic restrictions. The first dummy variable is one if a state possesses regional reciprocity, zero otherwise; the second is one if a state possesses national reciprocity, zero otherwise; and the third is one if a state possesses national non-reciprocity, zero otherwise.[16]

While the main focus of our analysis considers the effects of deregulation, we also include other control variables – financial variables and state-level economic activity information. The financial variables fall into three categories – portfolio allocation decisions, income and expense factors, and risk variables. Our specification uses crude portfolio allocation decisions -- equity to assets, loans to assets, deposits to assets. In addition, we introduce more refinement in portfolio allocation effects – real estate loans to loans, commercial and industrial loans to loans, consumer loans to loans, and non-interest-earning deposits to deposits.

The income and expense variables measure the interest rate paid on liabilities, the interest rate earned on assets, and so on. More specifically, those variables include average interest cost (interest expense to liabilities), average non-interest cost (non-interest expense to liabilities), non-interest expense to total (interest and non-interest) expense, average interest revenue (interest revenue to assets), average non-interest revenue (non-interest revenue to assets), and non-interest revenue to total (interest and non-interest) income. Also, net charge-offs to loans

[16] Amel (1993) provides the initial specification for the three dummy variables. Daniels and Tirtirogul (1998) updated Amel's specification through 1995. We extend the dummy variables to 1998, where national non-reciprocity was legislated to become effective in September 1995. We code all states to possess national non-reciprocity in 1996 to 1998.

measures the riskiness of the portfolio. Finally, state-level economic information includes the unemployment rate, the population, and the population growth rate.

Empirical Tests

We extend the analysis of Amos (1992) and Cebula (1994) by employing pooled data, using more information on the balance sheet and income statement data of the banking system, and examining births, deaths and marriages within the commercial banking industry. Moreover, we adopt pooled and random-effects Tobit specifications both with and without robust or bootstrap estimation techniques.

The dependent variables in our regression analysis include the birth rate [new charters to total banks (CH/BK)], the death rate [failures to total banks (FL/BK)], and the merger rate [mergers to total banks (MG/BK)]. We collect the banking data in each state (and the District of Columbia) in each year from 1966 to 1998; the state-level economic data cover 1978 to 1998.

For each dependent variable, we implement two different regression analyses – looking for correlates with the dependent variables; and looking for timing relationships between the dependent variables themselves. For the first set of regressions, we include the same set of independent variables for each dependent variable. We include branching and merging regulatory variables,[17] portfolio allocation variables,[18] and state-level macroeconomic variables.[19]

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[17] Variables include the average number of branches per bank (BR/BK), dummy variable for when a state introduces multibank holding company activity within its borders (MBH), dummy variable for states with regional interstate bank holding company merger legislation (DREG) (In all cases save Oregon for several years, the regional bank holding merger legislation involves reciprocity. Oregon does not. We include Oregon with the other states with regional reciprocity legislation.), dummy variable for states with national interstate bank holding company legislation with reciprocity (DNATR), and dummy variable for states with national interstate bank holding company legislation without reciprocity (DNATNR).

[18] Variables include loans to assets (L/A), real estate loans to loans (REL/L), consumer loans to loans (CL/L), commercial and industrial loans to loans (CIL/L) deposits to assets (D/A), non-interest bearing deposits to deposits (DNI/D), and equity to assets (EQ/A); a risk variable – net charge-offs to loans (NCOFF/L); income and expense variables – non-interest income to income (NIY/Y), non-interest expense to expense (NIE/E), average interest cost (AIC, defined as interest expense to liabilities), average interest revenue (AIR, defined as interest income to assets), average non-interest cost (ANIC, defined as non-interest expense to liabilities), and average non-interest revenue (ANIR, defined as non-interest income to assets).

[19] Variables include the unemployment rate (UNEM), population (POP), and the population growth rate (POPG).

[20] Table 1 reports summary statistics for the variables used in our econometric work.

For the second time-series analysis, we regress each dependent variable onto lagged values of itself and lagged values of the other dependent variables. We then perform tests to determine whether the lagged values of other dependent variables significantly explain (Granger cause) the movement of a given dependent variable. For example, do previous mergers per bank significantly affect charters per bank?[21] While the Granger temporal-causality test determines whether changes in one variable (e.g., mergers per bank) lead changes in another variable (e.g., charters per bank), it does not determine whether there is an ongoing, long-run effect. Thus, we also test the null hypothesis that the sum of the coefficients equal zero. For example, do previous mergers per bank significantly affect charters per bank on an ongoing, cumulative basis?

Finally, since the dependent variables each have a number of zero entries, we perform pooled and random-effect Tobit regressions. We implement robust or bootstrapping to the error process in each specification.

Bank New-Charter, Failure, and Merger Rates: Regression Results

Bank New-Charter Rate Regressions. Table 2 reports the regression results for the bank birth rates (charters to total banks).[22] The number of branches per bank as well as the dummy variable for intrastate multibank holding company activity correlate positively with new bank charters per bank, although the second effect vanishes in the bootstrapping of the random-effects Tobit specification.[23] That is, more permissive intrastate branching regulation attracts new bank entry.

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[20] For the first set of regressions, we exclude the 1960s and most of the 1970s. The analysis runs from 1978 through 1998.

[21] Berger, Bonime, Goldberg, and White (1999), Keeton (2000), and Seelig and Critchfield (1999) debate that question as noted in our review of the literature. Those regressions employ the entire 1966 to 1998 data set, after allowing for three lagged values of the dependent variables.

[22] While the results do not generally change across the pooled and random-effects Tobit specifications, instances occur with different significance levels.

[23] The econometric software, Intercooled Stata 7.0, allows robust estimation for the pooled Tobit specification, but not for the random-effects Tobit specification. In that latter case, we employ bootstrapping with 1000 repetitions to obtain confidence ranges on the coefficient estimates. The Tables report the t-statistics obtained by dividing the

The magnitude of the branches-to-bank effect equals slightly more than 33 percent, which means that a one-standard deviation increase in branches to bank produces a slightly more than one-third standard deviation increase in the new charter rate.[24] The dummy variables capturing the effects of interstate holding company merger regulation do not provide strong or consistent findings. The few significant effects suggest that states permitting bank holding company acquisitions from other states discourage new bank charters.

States whose banks possess higher average loans to assets, equity to assets, or non-interest earning deposits to deposits also experience significantly higher charters per bank. The significance of the equity to assets and non-interest earning deposits to deposits variables disappears when considering robust or bootstrap standard errors and/or the random-effects Tobit specification. The magnitude of the loans-to-assets effect equals 25 percent. Intuitively, banks holding higher loans, higher equity, and higher non-interest earning deposits should all experience higher net income, other things constant. That is, loans typically earn a higher interest return; while equity and non-interest earning deposits do not generate direct interest expenses for the bank. Thus, higher net income should attract new entry. In addition, higher net charge-offs to loans associate with higher new bank charters, although the significance falls to the 10-percent level with the random-effects Tobit specification. That result may reflect reverse causality where new banks with limited experience in banking operations may exhibit, on average, higher net charge-offs as they learn the business. That explanation, however, requires some time, possibly several years, to evolve.

Next, non-interest expense to expense possesses a significant negative correlation with

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coefficient estimates by the bootstrap standard errors. That typically conforms to the bias-corrected confidence ranges. We discuss differences in footnotes and Tables notes.

[24] This calculation and those that follow concerning the magnitude of effects rely on the data in Table 1 in combination with the coefficient estimates. The magnitude effects reported below use the same notation – "magnitude equals X percent".

new charters per bank. That finding suggests that less-efficient, non-financial inputs, as measured by non-interest expense to expense, repel new banks. In other words, higher operating expenses erect a barrier to new bank charters. The magnitude of the non-interest-expense-to-expense effect equals 80-percent. Finally, both population and population growth possess significant positive correlations with new bank charters per bank, although the significance of the population effect vanishes in the random-effect Tobit specification. Those results indicate that a large and growing state needs more banking services.[25] The magnitudes of the population and its growth-rate effects equal 10- and 20-percent, respectively.

In sum, state-level deregulation of branching restrictions will, on average, encourage new entry, especially in states with a growing demand for banking services and with more-efficient non-financial inputs. Moreover, the non-interest expense to expense effect owns the largest magnitude.

Bank Failure Rate Regressions. Table 3 reports the regression results for the bank death rates (failures to total banks). None of the regulatory variables exhibit significant effects on bank failures. Thus, deregulation of intrastate and interstate branching and banking does not affect the pattern of bank failures.

Several bank- and state-specific variables, however, do significantly influence the failure rate. Not surprisingly, higher net charge-offs to loans possess a significant positive correlation with the bank failure rate. That is, riskier banking markets experience higher failure rates. The magnitude of the net-charge-offs-to-loans effect equals 75-percent. Higher non-interest income to income and lower average non-interest revenue associates positively with the bank failure rate. Thus, contrary to conventional wisdom, non-interest income may signal a riskier bank

[25] Low population may also reflect the presence of more rural rather than urban markets within the state.

strategy.[26] The magnitude of the non-interest-income-to-income effect equals 130-percent. Banks that generate revenue through non-interest sources may possess operating difficulties. Finally, limited evidence exists that a higher unemployment rate associates with a higher bank failure rate. That evidence largely appears in the pooled Tobit specification.

In sum, a banking system that relies more heavily on non-interest income and experiences more net charge offs exhibits a higher average failure rate. Moreover, the non-interest income effect exceeds the net charge off effect in magnitude.

Bank Merger Rate Regressions. Table 4 reports the regression results for the bank marriage rates (mergers to total banks). The number of branches per bank and the existence of multibank holding company activity within a state associate positively with the bank merger rate and states with national bank holding company merger legislation without reciprocity possess higher mergers per bank. That is, states with a regulatory stance that permits mergers experience a higher merger rate, other things constant. The magnitude of the branches-per-bank effect equals 35-percent. Also, the magnitudes of the dummy-variable effects for states with multibank holding company legislation, either locally (i.e., within the state) or nationally, equal 39 and 79 percent, respectively.

Higher non-interest expense to expense and lower non-interest deposits to deposits significantly associate with higher bank mergers. Also, higher average interest cost and to a lesser extent, lower average interest revenue associate positively with the bank merger rate. Those effects all appear consonant with poor performing banks, on average. Further, the magnitudes of the non-interest-expense-to-expense, non-interest-deposits-to-deposits, average-interest-cost, and average-interest-revenue effects equal more than 70, 25, 55, and 30 percent,

[26] Conventional wisdom suggests that banks reduce their risk when they diversify from only interest income to interest and non-interest income. But, Stiroh (2002) and DeYoung and Roland (2001) also find that non-interest income leads to riskier bank operations.

respectively.

In sum, the regulatory structure in a state significantly affects merger activity. States with more permissive branching and multibank holding company legislation associate with higher merger rates. Moreover, states with relatively poor bank performance – high non-interest expense to expense, high interest bearing deposits to deposits, high average interest cost, and low average interest revenue – spawn higher merger rates. Finally, the implementation of the Interstate Banking and Branching Efficiency Act, which allows interstate bank mergers, associates with a higher merger rate.

New-Charter, Failure, and Merger Rates: Causality Tests

Table 5 reports the timing (Granger causality) results as well as the accumulation of lagged effects for new-charter, failure, and merger rates.[27] Strong evidence exists that mergers within a state precede new charters. That is, more mergers lead to more new charters across all specifications. That finding supports the results reported in Berger, Bonime, Goldberg, and White (1999) and in Keeton (2000), but counters those in Seelig and Critchfield (1999). The evidence also suggests that an increase in bank failures per bank lead a reduction in bank mergers. This result suggests that failures and mergers substitute for each other at the margin.[28] That effect, however, receives weaker support when robust and bootstrap standard errors are calculated.

Table 5 also reports results for the long-run, cumulative effects. Here, the findings suggest that more mergers per bank lead to a cumulative increase in new charters per bank. Moreover, more failures per bank also lead to a cumulative increase in mergers. Once again, weaker support for the last findings emerges with robust and bootstrap standard errors.

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[27] Although researchers typically apply Granger (temporal) causality tests in a time series setting, a few researchers adopt Granger causality in a panel data setting. Holtz-Eakin, Newey, and Rosen (1988, 1989) provide a good theoretical foundation while Nair-Reichert and Weinhold (2001) and Podrecca and Carmeci (2001) report useful applications. The equation-by-equation regression results appear in the appendix in Tables A1, A2, and A3.

5. Conclusion

Regulatory reform not seen since the Great Depression swept the U.S. banking industry beginning in the early 1980s and culminating with the Interstate Banking and Branching Efficiency Act of 1994. Banking analysts anticipated dramatic consolidation with large numbers of mergers and acquisitions. Less well documented, but equally important, was the continuing entry of new banks, tempering the decline in the overall number of banking institutions.

Prior research (Amos, 1992; Cebula, 1994) considers the proximate causes of commercial bank failure rates, using cross-section data across states.[29] While Amos (1992) finds no significant effects of intrastate branching dummy variables, Cebula (1994) discovers that limited branching states experience significantly lower failure rates than statewide or unit branching states. Cebula's results, however, raise questions, since it seems inappropriate to lump statewide and unit branching states under the same "homogeneous" umbrella.

In addition to deaths (failures), this paper examines births and marriages in the U.S. commercial banking industry. Our regression analysis employs pooled cross-section, time-series data, using pooled and random-effects Tobit specifications both with and without robust or bootstrap estimation techniques. We perform two regression analyses. The first analysis tests for the correlates with birth, death, and marriage rates from a set of regulatory variables, balance sheet and income variables, and macroeconomic variables. The second analysis tests the temporal relationships between birth, death, and marriage rates.

Several general findings boiled to the surface. First, states with more branches per bank and states that permit multibank holding company activity within its borders correlate positively with new charters per bank and mergers per bank. That is, more-permissive state-level intrastate

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[28] Failures include outright failures and government-assisted mergers.

[29] Chou and Cebula (1996) perform similar analysis on the savings and loan failure rate, using a cross-section data across states.

branching regulation correlates with more new charters and mergers. We find, unlike Cebula (1994), no evidence that intrastate branching regulation correlates with the failure rate. Moreover, Stiroh and Strahan (2003) report significant evidence that intrastate and interstate branching and banking deregulation enhances the exit rate, where exit means mergers and failures. Our results match the Stiroh and Strahan's findings, if their results reflect mergers rather than failures.

Interestingly, the interstate branching and banking dummy variables possess few significant effects in birth, death, and marriage regressions, at least through 1998. The passage of interstate multibank holding company activity without reciprocity does significantly associate with increased merger activity. Coupling that lack of significant effects with the significant effects for the variable capturing intrastate branching effects (i.e., branches to banks and intrastate multibank holding company activity), we conclude that the birth, death, and marriage variables responded more to intrastate deregulation than to interstate deregulation.[30] While our findings do not rule out possible future effects of interstate banking and branching deregulation on births, deaths, and marriages, we find little evidence of such effects during the last quarter of the twentieth century. That is, the last major piece of relevant legislation that authorized full interstate branching and banking does not yet significantly affect births, deaths, and marriages.

In addition, mergers temporally lead new charters, supporting the findings of Berger, Bonime, Goldberg, and White (1999) and Keeton (2000), but countering the results of Seelig and Critchfield (1999). Also, failures temporally lead mergers, although not as strongly as the first temporal causality finding. In other words, failures may produce a wake-up call for other weak banks. Those banks should entertain merger possibilities on an accelerated time line.

In sum, intrastate and interstate deregulation of banking and branching activity has

[30] Jayaratne and Strahan (1998) report a similar pattern whereby "banks' efficiency improves sharply once restrictions on intrastate banking are lifted and, to a lesser extent, after interstate banking is permitted." (p. 241).

promoted significant consolidation, both on a national and state-by-state basis. That consolidation process has proceeded more slowly than many analysts projected, as new bank entry has cushioned the decline in banking institutions. We find that deregulation, especially intrastate branching, associates with higher merger and new charter rates. In addition, mergers temporally lead new charters, suggesting that mergers open opportunities for new bank entry.

Some analysts and regulators raise concerns about the future of small community banks and the availability of small business lending. Our findings offer some solace that community banks will continue to exist and prosper. If unmet demand for small business lending emerges, the existing regulatory environment leaves open the door to the entry of new banks.

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Table 1: Summary Statistics on Variables

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Structural Regressions					
CH/BK	1071	0.0228	0.0363	0.0000	0.3333
MG/BK	1071	0.0404	0.0471	0.0000	0.3380
FL/BK	1071	0.0095	0.0292	0.0000	0.5000
BR/BK	1071	7.3935	6.6184	0.0256	38.6607
MBH	1071	0.9300	0.2553	0.0000	1.0000
DREG	1071	0.1755	0.3806	0.0000	1.0000
DNATNR	1071	0.2493	0.4328	0.0000	1.0000
DNATR	1071	0.1429	0.3501	0.0000	1.0000
EQ/A	1071	0.0754	0.0149	-0.0071	0.1560
L/A	1071	0.5824	0.0793	0.3593	0.8229
REL/L	1071	0.3990	0.1286	0.0533	0.8353
CIL/L	1071	0.2664	0.0822	0.0286	0.5446
CL/L	1071	0.2359	0.1287	0.0459	0.9037
NCOFF/L	1071	0.0077	0.0080	-0.0027	0.0871
D/A	1071	0.7930	0.0896	0.3001	0.9125
DNI/D	1071	0.2237	0.0727	0.0597	0.5284
NIY/Y	1071	0.1353	0.0750	0.0380	0.5874
NIE/E	1071	0.4341	0.1038	0.1675	0.7743
AIC	1071	0.0498	0.0157	0.0173	0.1072
AIR	1071	0.0846	0.0147	0.0406	0.1394
ANIC	1071	0.0369	0.0100	0.0189	0.1100
ANIR	1071	0.0139	0.0124	0.0034	0.1186
ASSET	1071	0.4515	0.9008	0.0211	12.9000
UNEM	1071	0.0631	0.0214	0.0000	0.1802
POP	1071	4.8146	5.2477	0.4010	32.6828
POPG	1071	0.0095	0.0121	-0.0391	0.0811
Granger Causality Regressions					
CH/BK	1530	0.0218	0.0342	0.0000	0.3333
CH/BK(-1)	1530	0.0208	0.0329	0.0000	0.3333
CH/BK(-2)	1530	0.0201	0.0324	0.0000	0.3333
CH/BK(-3)	1530	0.0195	0.0320	0.0000	0.3333
MG/BK	1530	0.0328	0.0437	0.0000	0.3380
MG/BK(-1)	1530	0.0312	0.0431	0.0000	0.3380
MG/BK(-2)	1530	0.0286	0.0400	0.0000	0.3380
MG/BK(-3)	1530	0.0269	0.0379	0.0000	0.3380

Table 1: Summary Statistics on Variables (continued)

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Granger Causality Regressions					
FL/BK	1530	0.0068	0.0249	0.0000	0.5000
FL/BK(-1)	1530	0.0065	0.0245	0.0000	0.5000
FL/BK(-2)	1530	0.0063	0.0244	0.0000	0.5000
FL/BK(-3)	1530	0.0056	0.0202	0.0000	0.2857

Note: The variables are defined as follows: CH/BK = new bank charters to banks; MG/BK = bank mergers to banks; FL/BK = bank failures to banks; BR/BK = branches to banks; MBH = dummy variable equal to 1 if the state introduced acquisitions by multibank holding companies within the state; zero otherwise; DREG = dummy variable for states with regional interstate bank holding company mergers; DNATNR = dummy variable for states with national interstate bank holding company mergers with no reciprocity; DNATR = dummy variable for states with national interstate bank holding company mergers with reciprocity; EQ/A = equity to assets; L/A = loans to assets; REL/L = real estate loans to loans; CIL/L = commercial and industrial loans to loans; CL/L = consumer loans to loans; NCOFF/L = net charge-offs to loans; D/A = deposits to assets; DNI/D = non-interest-earning deposits to deposits; NIY/Y non-interest income to income; NIE/E non-interest expense to expense; AIC = average interest cost (interest expense to liabilities); AIR = average interest revenue (interest income to assets); ANIC = average non-interest cost (non-interest expense to liabilities; ANIR = average non-interest revenue (non-interest income to assets); ASSET = the average level of bank assets; UNEM = unemployment rate; POP = population; and POPG = population growth rate. The numbers in parentheses after the independent variables stand for the lag length. For example, FL/BK(-3) is bank failures to banks lagged three years.

Table 2: Structural Regressions: Bank Birth Rates

Variables	Pooled TOBIT		Random-Effects TOBIT	
	Ordinary	Robust	Ordinary	Bootstrap
Constant	-0.0843	-0.0843	0.0042	
	(-1.45)	(-1.06)	(0.07)	
BR/BK	0.0018*	0.0018*	0.0020*	0.0020**
	(6.48)	(3.23)	(6.33)	(2.26)
MBH	0.0144*	0.0144†	0.0092	0.0092
	(2.51)	(1.88)	(1.59)	(1.26)
DREG	-0.0010	-0.0010	-0.0046	-0.0046
	(-0.22)	(-0.15)	(-0.98)	(-0.76)
DNATNR	0.0077	0.0077	0.0038	0.0038
	(1.46)	(0.86)	(0.63)	(0.43)
DNATR	-0.0099†	-0.0099	-0.0079	-0.0079
	(-1.84)	(-1.38)	(-1.39)	(-1.11)
EQ/A	0.3715*	0.3715	0.3318**	0.3318
	(2.80)	(1.18)	(2.35)	(1.11)
L/A	0.1367*	0.1367*	0.1190*	0.1190*
	(5.44)	(3.33)	(4.64)	(3.01)
REL/L	-0.0189	-0.0189	-0.0145	-0.0145
	(-0.89)	(-0.48)	(-0.42)	(-0.28)
CIL/L	0.0152	0.0152	0.0687	0.0687
	(0.42)	(0.27)	(1.33)	(0.99)
CL/L	0.0502†	0.0502	-0.0207	-0.0207
	(1.80)	(1.40)	(-0.57)	(-0.28)
NCOFF/L	0.8784*	0.8784*	0.4024†	0.4024†
	(3.80)	(3.66)	(1.83)	(1.10)
D/A	0.0277	0.0277	0.0234	0.0234
	(0.85)	(0.60)	(0.70)	(0.41)
DNI/D	0.1096*	0.1096**	0.0121	0.0121
	(4.01)	(2.04)	(0.40)	(0.22)
NIY/Y	0.2242**	0.2242	0.0507	0.0507
	(2.05)	(1.40)	(0.48)	(0.20)
NIE/E	-0.2418**	-0.2418**	-0.2761*	-0.2761**
	(-2.47)	(-2.51)	(-3.02)	(-2.40)
AIC	-0.3161	-0.3161	-0.7677	-0.7677
	(-0.50)	(-0.46)	(-1.26)	(-0.95)
AIR	-0.1516	-0.1516	-0.0581	-0.0581
	(-0.37)	(-0.27)	(-0.15)	(-0.09)

Table 2: Structural Regressions: Bank Birth Rates (continued)

Variables	Pooled TOBIT		Random-Effects TOBIT	
	Ordinary	**Robust**	**Ordinary**	**Bootstrap**
ANIC	0.5390	0.5390	0.3489	0.3489
	(0.76)	(0.64)	(0.52)	(0.33)
ANIR	-1.2722†	-1.2722	0.2017	0.2017
	(-1.91)	(-1.21)	(0.31)	(0.11)
ASSET	-0.0097	-0.0097	0.0012	0.0012
	(-0.48)	(-0.33)	(0.61)	(0.17)
UNEM	-0.0659	-0.0659	-0.1056	-0.1056
	(-0.80)	(-0.58)	(-1.15)	(-0.76)
POP	0.0008*	0.0008**	0.0002	0.0002
	(2.89)	(2.31)	(0.59)	(0.15)
POPG	0.4106*	0.4106**	0.5698*	0.5698*
	(3.40)	(2.07)	(4.09)	(2.80)

Note: See Table 1. The dependent variable is new bank charters to banks (CH/BK). Regressions include pooled ordinary least squares (OLS), pooled Tobit, and random-effects Tobit specifications. Finally, we report t-statistics suing robust standard errors for the pooled OLS and pooled Tobit specifications and bootstrap standard errors for the random-effects Tobit specification.

* means significantly different from zero at the 1-percent level.
** means significantly different from zero at the 5-percent level.
† means significantly different from zero at the 10-percent level.

Table 3: Structural Regressions: Bank Death Rates

Variables	Pooled TOBIT		Random-Effects TOBIT	
	Ordinary	Robust	Ordinary	Bootstrap
Constant	0.0373	0.0373	0.0712	
	(0.49)	(0.35)	(0.88)	
BR/BK	0.0003	0.0003	0.0007	0.0007
	(0.72)	(0.38)	(1.39)	(0.48)
MBH	0.0035	0.0035	0.0018	0.0018
	(0.43)	(0.45)	(0.21)	(0.18)
DREG	-0.0050	-0.0050	-0.0031	-0.0031
	(-0.86)	(-0.91)	(-0.52)	(-0.54)
DNATNR	-0.0050	-0.0050	-0.0049	-0.0049
	(-0.77)	(-0.69)	(-0.72)	(-0.59)
DNATR	-0.0015	-0.0015	0.0016	0.0016
	(-0.23)	(-0.23)	(0.23)	(0.20)
EQ/A	0.0366	0.0366	0.1660	0.1660
	(0.21)	(0.19)	(0.85)	(0.51)
L/A	-0.0748**	-0.0748	-0.0931*	-0.0931
	(-2.37)	(-0.84)	(-2.66)	(-0.84)
REL/L	0.0389	0.0389	0.0342	0.0342
	(1.38)	(0.91)	(1.04)	(0.46)
CIL/L	0.0072	0.0072	0.0039	0.0039
	(0.15)	(0.17)	(0.07)	(0.06)
CL/L	-0.0462	-0.0462	-0.0418	-0.0418
	(-1.20)	(-1.06)	(-0.97)	(-0.67)
NCOFF/L	2.9723*	2.9723*	2.8775*	2.8775*
	(10.88)	(9.65)	(10.30)	(7.83)
D/A	0.0203	0.0203	0.0112	0.0112
	(0.48)	(0.32)	(0.25)	(0.15)
DNI/D	-0.1079*	-0.1079†	-0.1234*	-0.1234†
	(-2.76)	(-1.81)	(-2.91)	(-1.63)
NIY/Y	0.5621*	0.5621*	0.5151*	0.5151**
	(3.97)	(2.73)	(3.50)	(2.00)
NIE/E	-0.1829	-0.1829	-0.2087†	-0.2087
	(-1.47)	(-1.25)	(-1.66)	(-0.97)
AIC	-0.7269	-0.7269	-0.7974	-0.7974
	(-0.90)	(-0.54)	(-0.97)	(-0.48)
AIR	0.0755	0.0755	0.0026	0.0026
	(0.14)	(0.07)	(0.00)	(0.00)

Table 3: Structural Regressions: Bank Death Rates (continued)

Variables	Pooled TOBIT		Random-Effects TOBIT	
	Ordinary	**Robust**	**Ordinary**	**Bootstrap**
ANIC	0.4161	0.4161	0.5191	0.5191
	(0.44)	(0.33)	(0.54)	(0.39)
ANIR	-2.8780*	-2.8780*	-2.7969*	-2.7969**
	(-3.18)	(-2.95)	(-2.99)	(-2.04)
ASSET	0.0041	0.0041	0.0054	0.0054
	(0.17)	(0.12)	(0.21)	(0.06)
UNEM	0.2071**	0.2071**	0.2161†	0.2161
	(1.96)	(1.98)	(1.89)	(1.46)
POP	0.0003	0.0003	0.0004	0.0004
	(1.04)	(0.83)	(0.88)	(0.47)
POPG	-0.0043	-0.0043	-0.0479	-0.0479
	(-0.03)	(-0.04)	(-0.28)	(-0.25)

Note: See Table 1. The dependent variable is bank mergers to banks (MG/BK).

Table 4: Structural Regressions: Bank Marriage Rates

Variables	Pooled TOBIT		Random-Effects TOBIT	
	Ordinary	Robust	Ordinary	Bootstrap
Constant	-0.1394†	-0.1394	-0.1164	
	(-1.95)	(-1.47)	(-1.51)	
BR/BK	0.0018*	0.0018*	0.0025*	0.0025†
	(5.34)	(2.94)	(4.92)	(1.78)
MBH	0.0166**	0.0166†	0.0186**	0.0186†
	(2.21)	(1.74)	(2.32)	(1.63)
DREG	0.0086	0.0086	0.0045	0.0045
	(1.55)	(1.14)	(0.77)	(0.66)
DNATNR	0.0334*	0.0334*	0.0319*	0.0319*
	(5.31)	(3.65)	(4.51)	(3.16)
DNATR	0.0009	0.0009	-0.0027	-0.0027
	(0.14)	(0.10)	(-0.39)	(-0.29)
EQ/A	-0.1743	-0.1743	0.1444	0.1444
	(-1.04)	(-0.75)	(0.74)	(0.50)
L/A	-0.0556†	-0.0556	-0.0767**	-0.0767
	(-1.85)	(-1.30)	(-2.19)	(-1.29)
REL/L	0.1029*	0.1029**	0.0765**	0.0765[a]
	(3.79)	(2.46)	(2.09)	(1.40)
CIL/L	0.1429*	0.1429**	0.1209**	0.1209
	(3.06)	(2.07)	(2.08)	(1.16)
CL/L	0.1567*	0.1567*	0.1340*	0.1340†[a]
	(4.39)	(2.71)	(2.99)	(1.88)
NCOFF/L	-0.1230	-0.1230	0.2841	0.2841
	(-0.45)	(-0.27)	(0.99)	(0.49)
D/A	0.0239	0.0239	0.0156	0.0156
	(0.61)	(0.42)	(0.36)	(0.23)
DNI/D	-0.1606*	-0.1606*	-0.1766*	-0.1766*
	(-4.75)	(-3.55)	(-4.61)	(-3.98)
NIY/Y	-0.1257	-0.1257	-0.3013**	-0.3013
	(-0.98)	(-0.96)	(-2.16)	(-1.44)
NIE/E	0.3107*	0.3107*	0.3250*	0.3250*
	(2.68)	(2.53)	(2.80)	(2.68)
AIC	1.9769*	1.9769†	1.7246**	1.7246†
	(2.58)	(1.75)	(2.23)	(1.76)
AIR	-1.2067**	-1.2067	-1.1181**	-1.1181
	(-2.39)	(-1.36)	(-2.15)	(-1.36)

Table 4: Structural Regressions: Bank Marriage rates (continued)

Variables	Pooled TOBIT		Random-Effects TOBIT	
	Ordinary	Robust	Ordinary	Bootstrap
ANIC	-1.1165 (-1.30)	-1.1165 (-1.24)	-1.2304 (-1.39)	-1.2304 (-1.13)
ANIR	0.7091 (0.91)	0.7091 (0.81)	1.3578 (1.62)	1.3578 (0.96)
ASSET	-0.0353 (-1.44)	-0.0353 (-0.74)	-0.0199 (-0.75)	-0.0199 (-0.18)
UNEM	-0.0561 (-0.56)	-0.0561 (-0.50)	-0.0248 (-0.21)	-0.0248 (-0.23)
POP	0.0005† (1.65)	0.0005 (1.09)	0.0008 (1.34)	0.0008 (0.89)
POPG	-0.0412* (-0.28)	-0.0412* (-0.50)	0.1908 (1.01)	0.1908 (0.68)

Note: See Table 1. The dependent variable is bank failures to banks (FL/BK).

a The bias-corrected 95-percent confidence range for the bootstrap excluded zero while the t-statistic using the bootstrap standard error rejects coefficients different from zero at the 5-percent level. See footnote 16 for more details.

Table 5: Granger Causality and Cumulative Sum Tests: Birth, Death, and Marriage Rates

New-Charter Rate Regressions				
Lagged Terms	**Pooled TOBIT**		**Random-Effect TOBIT**	
	Granger	**Sum**	**Granger**	**Sum**
Failure Rate	0.74	1.04	2.23	1.04
Merger Rate	10.26*	28.22*	30.72*	28.17*
Failure Rate Regressions				
Lagged Terms	**Pooled TOBIT**		**Random-Effect TOBIT**	
	Granger	**Sum**	**Granger**	**Sum**
Charter Rate	1.78	2.57	5.35	2.57
Merger Rate	0.21	0.24	0.63	0.24
Merger Rate Regressions				
Lagged Terms	**Pooled TOBIT**		**Random-Effect TOBIT**	
	Granger	**Sum**	**Granger**	**Sum**
Charter Rate	1.21	2.01	3.63	2.01
Failure Rate	10.11*	12.24**	30.34*	12.24*

Note: The dependent variables are new-charters to banks (CH/BK), failures to banks (FL/BK), and mergers to banks (MG/BK). All regressions employed pooled data and include three lags of each right-side variable. The test statistics for the Granger causality tests in the pooled ordinary least squares (OLS) and pooled Tobit regressions are F-statistics (3, 1520) and for the Granger causality tests in the random-effects Tobit regressions are χ^2-statistics with 3 degrees of freedom. The statistic testing for the sum of the coefficients equal to zero is an F-statistic (1, 1520) for the pooled OLS and pooled Tobit regressions and a χ^2-statistic with 1 degree of freedom for the random-effects Tobit regressions.

* means significant at the 1-percent level.
** means significant at the 5-percent level.
† means significant at the 10-percent level.

Appendix:

Table A1: Time-Series Regressions: Bank Birth Rates

Variables	Pooled TOBIT	Random-Effect TOBIT
Constant	-0.0055* (-3.70)	-0.0055* (3.69)
CH/BK(-1)	0.4486* (13.25)	0.4484* (13.24)
CH/BK(-2)	0.2796* (7.87)	0.2794* (7.87)
CH/BK(-3)	0.0352 (0.99)	0.0349 (0.99)
MG/BK(-1)	0.0768* (3.02)	0.0768* (3.02)
MG/BK(-2)	0.0195 (0.69)	0.0195 (0.69)
MG/BK(-3)	0.0726* (2.61)	0.0726* (2.61)
FL/BK(-1)	-0.0513 (-1.11)	-0.0512 (-1.11)
FL/BK(-2)	0.0438 (0.87)	0.0439 (0.87)
FL/BK(-3)	-0.0517 (-0.89)	-0.0518 (-0.89)
Adjusted R^2		

Note: The dependent variable is new bank charters to banks (CH/BK). Other independent variables are defined as follows: MG/BK = bank mergers to banks and FL/BK = bank failures to banks. The numbers in parentheses after the independent variables stand for the lag length. For example, FL/BK(-3) is bank failures to banks lagged three years.). Regressions include pooled ordinary least squares (OLS), pooled Tobit, and random-effects Tobit specifications.

* means significantly different from zero at the 1-percent level.
** means significantly different from zero at the 5-percent level.
† means significantly different from zero at the 10-percent level.

Table A2: Time-Series Regressions: Bank Death Rates

Variables	Pooled TOBIT	Random-Effect TOBIT
Constant	-0.0367*	-0.0362*
	(-13.41)	(-15.46)
CH/BK(-1)	-0.0560	0.0923**
	(-0.96)	(2.21)
CH/BK(-2)	0.0785	0.1992*
	(1.41)	(5.27)
CH/BK(-3)	0.0672	0.0166
	(1.22)	(0.36)
MG/BK(-1)	-0.0160	0.0543†
	(-0.40)	(1.67)
MG/BK(-2)	0.0166	-0.0155
	(0.38)	(-0.45)
MG/BK(-3)	0.0240	0.0608†
	(0.56)	(1.91)
FL/BK(-1)	0.5645*	0.2053*
	(9.83)	(5.54)
FL/BK(-2)	0.0484	0.0662
	(0.70)	(1.21)
FL/BK(-3)	0.3501*	0.0886
	(4.69)	(1.27)
Adjusted R^2		

Note: See Table A1. The dependent variable is bank failures to banks (FL/BK).

Table A3: Time-Series Regressions: Bank Marriage Rates

Variables	Pooled TOBIT	Random-Effect TOBIT
Constant	-0.0041†	-0.0041†
	(-1.90)	(-1.90)
CH/BK(-1)	0.0034	0.0034
	(0.07)	(0.07)
CH/BK(-2)	-0.0886†	-0.0887†
	(-1.65)	(-1.65)
CH/BK(-3)	0.0125	0.0125
	(0.25)	(0.25)
MG/BK(-1)	0.3277*	0.3277*
	(9.57)	(9.57)
MG/BK(-2)	0.2963*	0.2963*
	(7.91)	(7.91)
MG/BK(-3)	0.2499*	0.2499*
	(6.51)	(6.51)
FL/BK(-1)	0.2765*	0.2765*
	(4.69)	(4.69)
FL/BK(-2)	-0.2024*	-0.2024*
	(-2.94)	(-2.94)
FL/BK(-3)	0.1918**	0.1918**
	(2.53)	(2.53)
Adjusted R^2		

Note: See Table A1. The dependent variable is bank mergers to banks (MG/BK).